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**PATENT APPLICATION**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re application of

Docket No: CA1122

Yihong GONG, et al.

Appln. No.: 09/817,591

Group Art Unit: 2176

Confirmation No.: 7751

Examiner: Quoc A. TRAN

Filed: March 26, 2001

For: TEXT SUMMARIZATION USING RELEVANCE MEASURES AND LATENT  
SEMANTIC ANALYSIS

**SUBMISSION OF APPEAL BRIEF**

**MAIL STOP APPEAL BRIEF - PATENTS**

Commissioner for Patents


P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

Submitted herewith please find an Appeal Brief. A check for the statutory fee of \$500.00 is attached. The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account. A duplicate copy of this paper is attached.

Respectfully submitted,

  
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WASHINGTON OFFICE

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## PATENT APPLICATION

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#### APPEAL BRIEF UNDER 37 C.F.R. § 41.37

#### MAIL STOP APPEAL BRIEF - PATENTS

Commissioner for Patents

P.O. Box 1450

Alexandria, VA 22313-1450

Sir:

In accordance with the provisions of 37 C.F.R. § 41.37, Appellants submit the following:

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APPEAL BRIEF UNDER 37 C.F.R. § 41.37  
U.S. APPLICATION NO. 09/817,591  
ATTORNEY DOCKET NO. CA1122

**I. REAL PARTY IN INTEREST**

Based on information supplied by the Appellants and to the best knowledge of the Appellants' legal representatives, the real party in interest here is the assignee, NEC Corporation, by virtue of an Assignment executed on April 11, 2003 and recorded on April 11, 2003 at Reel 013962, Frame 0288.

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## **II. RELATED APPEALS AND INTERFERENCES**

To the best of their knowledge, there are no other related appeals or interferences known to Appellants, Appellants' legal representatives or the assignee that will directly affect or be directly affected by or have a bearing on the Board's decision in the pending Appeal.

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### **III. STATUS OF CLAIMS**

Claims 1-32 are all the claims pending in the application. Claims 1, 9, 13, 21, 26 and 29 are the independent claims.

Claims 1 and 9 stand rejected under 35 U.S.C. § 102(e) as allegedly being anticipated by Billheimer *et al.* (U.S. Patent No. 6,611,825).

Claims 2-8 and 10-32 stand rejected under 35 U.S.C. § 103(a) as allegedly being anticipated by Billheimer *et al.* in view of Herz (U.S. Patent No. 6,029,195).

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**IV. STATUS OF AMENDMENTS**

The Response Under 37 C.F.R. § 1.116, filed on June 6, 2005, made no further amendments to claims 1-32. Therefore, all amendments to the claims, which have been made during the prosecution of the present application, have been entered.

**V. SUMMARY OF THE CLAIMED SUBJECT MATTER**

Claim 1 is a method of creating a generic text summary of a document. First, a weighted document term-frequency vector for the document is created. (*see* page 6, line 18 – page 7, line 28; page 8, lines 1-5; Figure 1, step 102 of the specification). Next, for each sentence in the document, a weighted sentence term-frequency vector is created. (*see* page 6, line 18 – page 7, line 28; page 8, lines 1-5; Figure 1, step 102 of the specification). A score for each weighted sentence term-frequency vector is computed in accordance with relevance to the weighted document term-frequency vector. (*see* page 8, lines 7-11; Figure 1, step S103). Finally, a sentence is selected for inclusion in the generic text summary in accordance with the computing. (*see* page 8, lines 12-17, 22-27; Figure 1, step S104 of the specification).

Claim 9 recites a system for creating a generic text summary of a document. The system comprises a computer, a display for displaying the generic text summary and summarizer program code, operable on the computer, for analyzing and summarizing the document. The summarizer program code comprises a vector generator for creating a weighted document term-frequency vector for the document and creating a weighted sentence term-frequency vector for each sentence in the document. (*see* page 6, line 18 – page 7, line 28; page 8, lines 1-5; Figure 1, step 102 of the specification). The summarizer program code further comprises a scoring engine for computing a score for each the weighted sentence term-frequency vector in accordance with relevance to the weighted document term-frequency vector. (*see* page 8, lines 7-11; Figure 1, step S103). The summarizer program code further comprises a selector for selecting a sentence

for inclusion in the generic text summary in accordance with output results from the scoring engine. (*see* page 8, lines 12-17, 22-27; Figure 1, step S104 of the specification).

Claim 13 recites a method of creating a generic text summary of a document. The document is decomposed into individual sentences, and a candidate sentence set is formed from the individual sentences. (*see* page 7, line 31 – page 8, line 1; Figure 1, step S101). For each of the individual sentences in the candidate sentence set, a weighted sentence term-frequency vector is created. (*see* page 6, line 18 – page 7, line 28; page 8, lines 1-5; Figure 1, step 102 of the specification). Next, a weighted document term-frequency vector for the document is created. (*see* page 6, line 18 – page 7, line 28; page 8, lines 1-5; Figure 1, step 102 of the specification). For each of the individual sentences in the candidate sentence set, a relevance score for the weighted sentence term-frequency vector relative to the weighted document term-frequency vector is computed. (*see* page 8, lines 7-11; Figure 1, step S103). After the computing of the relevance score, a sentence is selected for inclusion in the generic text summary in accordance with the computing of the relevance score. (*see* page 8; lines 12-17, 22-27; Figure 1, step S104 of the specification). The selected sentence is deleted from the candidate sentence set, and terms in the selected sentence are eliminated from the document. (*see* page 8, lines 12-17; Figure 1, step S105). The weighted document term-frequency vector is recreated in accordance with the deleting of the selected sentence and the eliminating of the terms of the selected sentence. (*see* page 6, lines 18-28; Figure 1, step S106).



Claim 21 is a method of creating a generic text summary of a document. A terms-by-sentences matrix for the document is constructed. (*see* page 9, lines 11-24; page 11, lines 19-23; Figure 2, step S202). Singular value decomposition is performed on the terms-by-sentences matrix to obtain a singular value matrix and a right singular vector matrix, wherein each sentence in the document is represented by a column vector of a transpose of the right singular vector matrix. (*see* page 9, line 25 – page 10, line 16; Figure 2, step S203). Each right singular vector is ranked in the right singular vector matrix. (*see* page 11, lines 4-14; page 12, line 4-11; Figure 2, step S204). A sentence is selected for inclusion in the generic text summary in accordance with the ranking. (*see* page 11, lines 29-31; Figure 2, step S205).

Claim 26 is a system for creating a generic text summary of a document. The system comprises a computer, a display for displaying the generic text summary and summarizer program code, operable on the computer, for analyzing and summarizing the document. The summarizer program code comprises a matrix generator for creating a terms-by-sentences matrix for the document. (*see* page 9, lines 11-24; page 11, lines 19-23; Figure 2, step S202). The summarizer program code further comprises an SVD performer for performing singular value decomposition on the terms-by-sentences matrix to generate a singular value matrix and a right singular vector matrix. (*see* page 9, line 25 – page 10, line 16; Figure 2, step S203). The summarizer program code further comprises a vector analyzer for ranking each sentence in the terms-by-sentences matrix in accordance with index values with the right singular vector matrix. (*see* page 11, lines 4-14; page 12, lines 4-11; Figure 2, step S204). The summarizer program

code further comprises a selector for selecting a sentence for inclusion in the generic text summary in accordance with output results from the vector analyzer. (*see* page 11, lines 29-31; Figure 2, step S205).

Claim 29 is a method of creating a generic text summary of a document. The document is decomposed into individual sentences. (*see* page 9, lines 6-9; page 11, lines 11-16; Figure 2, step S201). Next, a candidate sentence set from the individual sentences is formed. (*see* page 9, lines 6-9; page 11, lines 11-16; Figure 2, step S201). A terms-by-sentences matrix for the document is constructed. (*see* page 9, lines 11-24; page 11, lines 19-23; Figure 2, step S202). Singular value decomposition is performed on the terms-by-sentences matrix to obtain a singular value matrix and a right singular vector matrix, wherein each sentence in the candidate sentence set is represented by a column vector of a transpose of the right singular vector matrix. (*see* page 9, line 25 – page 10, line 16; Figure 2, step S203). Next, a right singular vector from the right singular vector matrix is identified. (*see* page 11, lines 4-14; page 12, line 4-11; Figure 2, step S204). A sentence for inclusion in the generic text summary is selected in accordance with the identification of a right singular vector. (*see* page 11, lines 29-31; Figure 2, step S205). The identification of a right singular vector and the selection of a sentence for inclusion in the generic text summary is selectively repeated. (*see* page 11, line 31 – page 12, line 3; Figure 2, step S206).

**VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

- A. The rejection of claims 1 and 9 under 35 U.S.C. § 102(e) as allegedly being anticipated by Billheimer *et al.* (U.S. Patent No. 6,611,825).
- B. The rejection of claims 2-8 and 10-12 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Billheimer *et al.* in view of Herz (U.S. Patent No. 6,029,195).
- C. The rejection of claims 13-20 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Billheimer *et al.* in view of Herz.
- D. The rejection of claims 21-25 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Billheimer *et al.* in view of Herz.
- E. The rejection of claims 26-28 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Billheimer *et al.* in view of Herz.
- F. The rejection of claims 29-32 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Billheimer *et al.* in view of Herz.

## **VII. ARGUMENT**

### ***A. Billheimer et al. Do Not Anticipate Claims 1 and 9***

Claim 1 recites a method of creating a generic text summary of a document, wherein the method comprises creating a weighted document term-frequency vector for the document; for each sentence in the document, creating a weighted sentence term-frequency vector; and computing a score for each weighted sentence term-frequency vector in accordance with relevance to the weighted document term-frequency vector. Appellants submit, however, that Billheimer *et al.* fail to teach or suggest at least these features of the invention as recited in claim 1.

As shown at step 102 of Figure 1 of the instant application, a weighted term-frequency vector  $A_i$  is created for each sentence  $i \in S$ , and a weighted term-frequency vector  $D$  is created for the document. At step 103, a relevance score between  $A_i$  and  $D$  is computed for each sentence  $i \in S$ .

In contrast, Billheimer *et al.* only teach a term-frequency matrix  $A$  defined from a set of documents. Each entry in  $A$  is the raw frequency of a term in a given document, *i.e.*,  $A_{ij}$  is the number of times a term  $t_i$  occurs in a  $D_j$ . See Billheimer *et al.*, col. 11, lines 2-11. The text mining operation (step 118 of Fig. 3 of Billheimer *et al.*), the re-indexing operation (step 112 of Fig. 3 of Billheimer *et al.*) and the update indexing operation (step 118 of Fig. 3 of Billheimer *et al.*) are all based on the term-frequency matrix  $A$ .

Previously, the Examiner asserted that Billheimer *et al.* taught creating a weighted sentence term-frequency vector, referring to column 6, line 20-35 of Billheimer *et al.* As pointed

out by Appellants in the December 22, 2004 Rule 111 Response, the cited text referred to by the Examiner is about information retrieval (step 201 in Fig. 8A of Billheimer *et al.*) and document cross-referencing (step 218 in Fig. 8B of Billheimer *et al.*), not about creating a generic text summary of a document.

Previously, the Examiner asserted that Billheimer *et al.* taught computing a score for each weighted sentence term-frequency vector in accordance with relevance to the weighted document term-frequency vector, referring to column 17, lines 25-35 of Billheimer *et al.* The text of Billheimer *et al.* cited by the Examiner, however, is about a pictorial representation of a term frequency matrix. As shown in Fig. 15 of Billheimer *et al.*, each column of the matrix represents a document in a document collection, and each row represents a term found in one or more of the documents. For each entry, the raw number of occurrences of the term for the given row for the document is displayed (Billheimer *et al.*, col. 17, lines 25-30). For example, the term “apache” occurs 15 times in a Document A, 10 times in a Document C, 12 times in a Document E, and 0 time in Documents B, D, and F. Thus, the cited text referred to by the Examiner only teaches term frequency matrix of a document. It has nothing to do with weighted sentence term-frequency vector, or computing a score for each weighted sentence term-frequency vector in accordance with relevance to the weighted document term-frequency vector.

Although admittedly Billheimer *et al.* teach computing a score for a vector, the vector is a query vector, not a weighted sentence term-frequency vector. In addition, although admittedly Billheimer *et al.* disclose the calculation of relative value for the number of occurrences in Fig. 16, the relative value is still about a document, not a sentence. For example, in the Document A,

the term “Apache” occurs 15 times, and the term “Rotorcraft” occurs 25 times. In Fig. 16, the relative value for the number of occurrences for the term “Apache” is  $15/(15+25) = 0.375$ , and the relative value for the term “Rotorcraft” is  $25/(15+25) = 0.625$ . Thus, Appellants submit that Billheimer *et al.* fail to teach or suggest computing a score for each weighted sentence term-frequency vector in accordance with relevance to the weighted document term-frequency vector.

In the Final Office Action, the Examiner has reiterated its position that Billheimer *et al.* disclose computing a score for each weighted sentence term-frequency vector. *See* pg. 20 of the April 20, 2005 Office Action. In the Office Action, the Examiner alleges that column 11, line 20 through column 18, line 35 of Billheimer *et al.* discloses document decomposition based on a term basis matrix, a weight matrix and a document basis matrix. However, the Examiner fails to point to any cogent teaching or suggestion of creating a weighted sentence term-frequency vector, or any teaching or suggestion of computing a score for each weighted sentence term-frequency vector in accordance with relevance to a weighted document term-frequency vector. The word “sentence” appears only once in the disclosure of Billheimer *et al.*, and it appears in a background discussion that denigrates techniques that parse sentences as requiring prior knowledge that difficult to construct and maintain. *See* col. 2, lines 43-65 of Billheimer *et al.* Appellants fail to understand how the Examiner can allege Billheimer *et al.* disclose creating a weighted sentence term-frequency vector and computing a score from such a vector when the disclosure of Billheimer *et al.* discounts methods that parse sentences and fails to even use the word “sentence” when discussing its various document matrices.

Based on at least the foregoing reasons, Appellants submit that claim 1 is allowable over Billheimer *et al.*, and respectfully request that the Board of Patent Appeals and Interferences overturn the Examiner's § 102(e) rejection of claim 1.

Independent claim 9 recites a system that utilizes a computer to execute summarizer program code that comprises a vector generator that creates a weighted document term-frequency vector for the document, and for each sentence in the document, creating a weighted sentence term-frequency vector; a scoring engine for computing a score for each weighted sentence term-frequency vector in accordance with relevance to the weighted document term-frequency vector; and a selector that selects a sentence for inclusion in a generic text summary using results from the scoring engine. As discussed above with respect to claim 1, Billheimer *et al.* has nothing to do with weighted sentence term-frequency vector, or computing a score for each weighted sentence term-frequency vector in accordance with relevance to the weighted document term-frequency vector. Appellants herein incorporate by reference the arguments against the applicability of Billheimer *et al.* to claim 1 as being equally applicable to claim 9.

Based on at least the foregoing reasons, Appellants submit that claim 9 is allowable over Billheimer *et al.*, and respectfully request that the Board of Patent Appeals and Interferences overturn the Examiner's § 102(e) rejection of claim 9.

***B. Claims 2-8 and 10-12 Are Not Obvious Over Billheimer et al. in view of Herz***

As discussed above with respect to claim 1, Billheimer *et al.* fail to teach or suggest at least creating a weighted sentence term-frequency vector, or computing a score for each weighted sentence term-frequency vector in accordance with relevance to a weighted document term-frequency vector, as recited in claim 1 and included in claims 2-8 by virtue of their dependency from claim 1. The Examiner cannot, however, point to any teaching or suggestion in Herz that overcomes Billheimer *et al.*'s fundamental flaw with respect to creating a weighted sentence term-frequency vector. Herz is simply cumulative of the teachings of Billheimer *et al.* For example, at column 13, lines 40-67 of Herz, the Examiner claims that the creation of a term frequency of a word is identical to the recreation of a weighted document term-frequency vector. The Examiner's analysis Herz, however, suffers from the same flaw as Billheimer *et al.*, in that Herz discloses the calculation of relative value for the number of occurrences of a term in a document, the relative value is still about a document, not a sentence.

Based on at least the foregoing reasons, Appellants submit that claims 2-8 are allowable at least by virtue of their dependency from claim 1. Appellants respectfully request that the Board of Patent Appeals and Interferences overturn the Examiner's § 103(a) rejection of claims 2-8.

As discussed above with respect to claim 9, Billheimer *et al.* fail to teach or suggest at least a vector generator for creating a weighted sentence term-frequency vector, or a scoring engine for computing a score for each weighted sentence term-frequency vector in accordance with relevance to a weighted document term-frequency vector, as recited in claim 9 and included



in claims 10-12 by virtue of their dependency from claim 9. As discussed above with respect to claims 2-8, Herz does not cure the deficient teachings of Billheimer *et al.* with respect to claims 10-12. Appellants submit that claims 10-12 are allowable at least by virtue of their dependency from claim 9, and Appellants respectfully request that the Board of Patent Appeals and Interferences overturn the Examiner's § 103(a) rejection of claims 10-12.

***C. Claims 13-20 Are Not Obvious Over Billheimer et al. in view of Herz***

Claim 13 recites elements that are similar in scope to claims 1 and 2 of the instant application. From the above discussion regarding Billheimer *et al.* and Herz, Appellants submit that neither reference, either alone or in combination, teach or suggest at least creating a weighted sentence term-frequency vector, or computing a relevance score for each weighted sentence term-frequency vector in accordance with relevance to a weighted document term-frequency vector, as recited in independent claim 13. The above discussion regarding the lack of disclosure with respect to the creation of weighted sentence term-frequency vector and computing relevance scores is incorporated by reference.

Based on at least the foregoing reasons, Appellants submit that claims 13-20 are allowable over the combination of Billheimer *et al.* and Herz. Appellants respectfully request that the Board of Patent Appeals and Interferences overturn the Examiner's § 103(a) rejection of claims 13-20.

***D. Claims 21-25 Are Not Obvious Over Billheimer et al. in view of Herz***

As discussed in the Rule 111 Response filed December 22, 2004, claim 21 recites a method of creating a generic text summary of a document, wherein the method comprises constructing a terms-by-sentences matrix for a document; and performing singular value decomposition on the terms-by-sentences matrix to obtain a singular value matrix and a right singular vector matrix, wherein each sentence in the document is represented by a column vector of a transpose of the right singular vector matrix.

As discussed above with respect to claim 1, Billheimer *et al.* only teach a term-frequency matrix A, each entry of which is the frequency of a term in the given document; and Herz only teaches basing a target profile on the frequency with which each word appears in an article relative to its overall frequency of use in all articles. None of the cited references teaches or suggests the recited terms-by-sentences matrix.

The Examiner has acknowledged that Billheimer *et al.* fail to teach or suggest constructing a terms-by-sentences matrix for the document, and performing singular value decomposition on the terms-by-sentences matrix, but asserts that Herz provides the features, referring to column 16, lines 40-65 of Herz.

The text portion of Herz cited by the Examiner discusses a general approach to recognizing synonyms, using a measure of distances between textual attribute vectors V and U, namely  $\arccos (AV(AU)^t / \sqrt{(AV(AV)^t AU(AU)^t)})$ , where the matrix A is the dimensionality-reducing linear transformation determined by collecting the vector values of the textual attribute, for all target objects known to the system, and applying singular value decomposition to the

resulting collection. It appears that the Examiner is again asserting that the collection of the vector values of the textual attribute, for all target objects known to the system, teaches the terms-by-sentences matrix. However, as defined in column 4 of Herz, a “target object” is an object available for access by the user, which may be either physical or electronic in nature. There is no teaching or suggestion in Herz that the collection of the vector values of the textual attribute for all target objects known to the system is a terms-by-sentences matrix. In addition, the purpose of Herz is to locate target objects from a vast amount of on-line information for users with particular interests. Thus, the combination of Bellheimer *et al.* and Herz fails to teach or suggest at least the construction of a terms-by-sentences matrix for a document. The Examiner’s argument is purely speculative regarding Herz’s alleged terms-by-sentences matrix.

Based on at least the foregoing reasons, Appellants submit that claims 21-25 are allowable over the combination of Billheimer *et al.* and Herz. Appellants respectfully request that the Board of Patent Appeals and Interferences overturn the Examiner’s § 103(a) rejection of claims 21-25.

***E. Claims 26-28 Are Not Obvious Over Billheimer et al. in view of Herz***

With respect to independent claim 26, Appellants submit that claim 26 is allowable over the combination of Billheimer *et al.* and Herz for at least reasons analogous to those discussed above with respect to claim 21. The Examiner has implicitly acknowledged that Billheimer *et al.* fail to teach or suggest a matrix generator for constructing a terms-by-sentences matrix for the document, and a SVD performer for performing singular value decomposition on the terms-by-

sentences matrix, but asserts that Herz provides the features, referring to column 16, lines 40-65 of Herz. However, as discussed above with respect to claim 21, there is no teaching or suggestion in Herz that the collection of the vector values of the textual attribute for all target objects known to the system is a terms-by-sentences matrix. Thus, the combination of Bellheimer *et al.* and Herz fails to teach or suggest at least the construction of a terms-by-sentences matrix for a document. The Examiner's argument is purely speculative regarding Herz's alleged terms-by-sentences matrix.

Based on at least the foregoing reasons, Appellants submit that claims 26-28 are allowable over the combination of Billheimer *et al.* and Herz. Appellants respectfully request that the Board of Patent Appeals and Interferences overturn the Examiner's § 103(a) rejection of claims 26-28.

***F. Claims 29-32 Are Not Obvious Over Billheimer et al. in view of Herz***

With respect to independent claim 29, Appellants submit that claim 29 is allowable over the combination of Billheimer *et al.* and Herz for at least reasons analogous to those discussed above with respect to claim 21. The Examiner has implicitly acknowledged that Billheimer *et al.* fail to teach or suggest constructing a terms-by-sentences matrix for the document, and performing singular value decomposition on the terms-by-sentences matrix, but asserts that Herz provides the features, referring to column 16, lines 40-65 of Herz. However, as discussed above with respect to claim 21, there is no teaching or suggestion in Herz that the collection of the vector values of the textual attribute for all target objects known to the system is a terms-by-

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sentences matrix. Thus, the combination of Bellheimer *et al.* and Herz fails to teach or suggest at least the construction of a terms-by-sentences matrix for a document. The Examiner's argument is purely speculative regarding Herz's alleged terms-by-sentences matrix.

Based on at least the foregoing reasons, Appellants submit that claims 29-32 are allowable over the combination of Billheimer *et al.* and Herz. Appellants respectfully request that the Board of Patent Appeals and Interferences overturn the Examiner's § 103(a) rejection of claims 29-32.

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### VIII. CONCLUSION

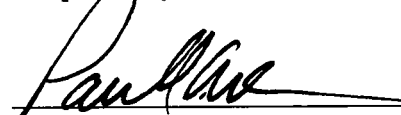
It is respectfully requested that the Board of Patent Appeals and Interferences reverse the rejection of claims 1 and 9 as being anticipated under 35 U.S.C. § 102(e) by Billheimer *et al.* (U.S. Patent No. 6,611,825).

It is respectfully requested that the Board of Patent Appeals and Interferences reverse the rejection of claims 2-8 and 10-32 as being unpatentable under 35 U.S.C. § 103(a) over Billheimer *et al.* in view of Herz

Unless a check is submitted herewith for the fee required under 37 C.F.R. §41.37(a) and 1.17(c), please charge said fee to Deposit Account No. 19-4880.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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WASHINGTON OFFICE

**23373**

CUSTOMER NUMBER

Date: October 21, 2005

**CLAIMS APPENDIX**

**CLAIMS 1-32 ON APPEAL:**

1. A method of creating a generic text summary of a document; said method comprising:
  - creating a weighted document term-frequency vector for said document;
  - for each sentence in said document, creating a weighted sentence term-frequency vector;
  - computing a score for each said weighted sentence term-frequency vector in accordance with relevance to said weighted document term-frequency vector; and
  - selecting a sentence for inclusion in said generic text summary in accordance with said computing.
2. The method of claim 1 further comprising:
  - deleting said sentence from said document and eliminating terms in said sentence from said document;
  - recreating said weighted document term-frequency vector in accordance with said deleting and said eliminating; and
  - selectively repeating said computing, said selecting, said deleting, said eliminating, and said recreating.

3. The method of claim 2 wherein said selectively repeating is terminated when a predetermined number of sentences has been selected.

4. The method of claim 1 wherein said computing comprises calculating an inner product of said weighted sentence term-frequency vector and said weighted document term-frequency vector.

5. The method of claim 1 wherein said creating a weighted sentence term-frequency vector comprises implementing a local weighting function and implementing a global weighting function.

6. The method of claim 5 wherein said creating a weighted sentence term-frequency vector comprises normalizing each said weighted sentence term-frequency vector.

7. The method of claim 1 wherein said creating a weighted document term-frequency vector comprises implementing a local weighting function and implementing a global weighting function.

8. The method of claim 7 wherein said creating a weighted document term-frequency vector comprises normalizing said weighted document term-frequency vector.



9. A system for creating a generic text summary of a document; said system comprising:

- a computer;
- a display for displaying said generic text summary; and
- summarizer program code, operable on said computer, for analyzing and summarizing said document; said summarizer program code comprising:
  - a vector generator for creating a weighted document term-frequency vector for said document and creating a weighted sentence term-frequency vector for each sentence in said document;
  - a scoring engine for computing a score for each said weighted sentence term-frequency vector in accordance with relevance to said weighted document term-frequency vector; and
  - a selector for selecting a sentence for inclusion in said generic text summary in accordance with output results from said scoring engine.

10. The system of claim 9 wherein said summarizer program code further comprises a document editor for deleting said sentence from said document and for eliminating terms in said sentence from said document; and wherein said vector generator recreates said weighted document term-frequency vector in accordance with output results from said document editor.

11. The system of claim 10 wherein said summarizer further comprises a loop routine for generating iterative sequential operations of said vector generator, said scoring engine, said selector, and said document editor.

12. The system of claim 11 wherein said loop routine is responsive to a predetermined limit such that said generic text summary is of a predetermined number of sentences.

13. A method of creating a generic text summary of a document; said method comprising:

decomposing said document into individual sentences;

forming a candidate sentence set from said individual sentences;

for each of said individual sentences in said candidate sentence set, creating a weighted sentence term-frequency vector;

creating a weighted document term-frequency vector for said document;

for each of said individual sentences in said candidate sentence set, computing a relevance score for said weighted sentence term-frequency vector relative to said weighted document term-frequency vector;

selecting a sentence for inclusion in said generic text summary in accordance with said computing;

deleting said sentence from said candidate sentence set;

eliminating terms in said sentence from said document; and  
recreating said weighted document term-frequency vector in accordance with said  
deleting and said eliminating.

14. The method of claim 13 further comprising:  
selectively repeating said computing, said selecting, said deleting, said eliminating, and  
said recreating.

15. The method of claim 14 wherein said selectively repeating is terminated when a  
predetermined number of sentences has been selected.

16. The method of claim 13 wherein said computing comprises calculating an inner  
product of said weighted sentence term-frequency vector and said weighted document term-  
frequency vector.

17. The method of claim 13 wherein said creating a weighted sentence term-  
frequency vector comprises implementing a local weighting function and implementing a global  
weighting function.

18. The method of claim 17 wherein said creating a weighted sentence term-frequency vector comprises normalizing each said weighted sentence term-frequency vector.

19. The method of claim 13 wherein said creating a weighted document term-frequency vector comprises implementing a local weighting function and implementing a global weighting function.

20. The method of claim 19 wherein said creating a weighted document term-frequency vector comprises normalizing said weighted document term-frequency vector.

21. A method of creating a generic text summary of a document; said method comprising:

constructing a terms-by-sentences matrix for said document;

performing singular value decomposition on said terms-by-sentences matrix to obtain a singular value matrix and a right singular vector matrix, wherein each sentence in said document is represented by a column vector of a transpose of said right singular vector matrix;

ranking each right singular vector in said right singular vector matrix; and

selecting a sentence for inclusion in said generic text summary in accordance with said ranking.

22. The method of claim 21 further comprising repeating said selecting.

23. The method of claim 22 wherein said repeating is terminated when a predetermined number of sentences has been selected.

24. The method of claim 21 wherein said selecting further comprises identifying a sentence having a desired index value with said right singular vector.

25. The method of claim 21 wherein said constructing comprises implementing a local weighting function and implementing a global weighting function.

26. A system for creating a generic text summary of a document; said system comprising:

a computer;

a display for displaying said generic text summary; and

summarizer program code, operable on said computer, for analyzing and summarizing said document; said summarizer program code comprising:

a matrix generator for creating a terms-by-sentences matrix for said document;

an SVD performer for performing singular value decomposition on said terms-by-sentences matrix to generate a singular value matrix and a right singular vector matrix;

a vector analyzer for ranking each sentence in said terms-by-sentences matrix in accordance with index values with said right singular vector matrix; and

a selector for selecting a sentence for inclusion in said generic text summary in accordance with output results from said vector analyzer.

27. The system of claim 26 wherein said summarizer program further comprises a loop routine for generating iterative operation of said selector.

28. The system of claim 27 wherein said loop routine is responsive to a predetermined limit such that said generic text summary is of a predetermined number of sentences.

29. A method of creating a generic text summary of a document; said method comprising:

decomposing said document into individual sentences;  
forming a candidate sentence set from said individual sentences;  
constructing a terms-by-sentences matrix for said document;  
performing singular value decomposition on said terms-by-sentences matrix to obtain a singular value matrix and a right singular vector matrix, wherein each sentence in said candidate sentence set is represented by a column vector of a transpose of said right singular vector matrix;  
identifying a right singular vector from said right singular vector matrix;

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selecting a sentence for inclusion in said generic text summary in accordance with said identifying; and

selectively repeating said identifying and said selecting.

30. The method of claim 29 wherein said selectively repeating is terminated when a predetermined number of sentences has been selected.

31. The method of claim 29 wherein said selecting further includes identifying a sentence in said candidate sentence set having a desired index value with said right singular vector.

32. The method of claim 29 wherein said constructing comprises implementing a local weighting function and implementing a global weighting function.

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**EVIDENCE APPENDIX**

Pursuant to 37 C.F.R. § 41.37(c)(1)(ix), evidence submitted pursuant to 37 C.F.R. §§  
1.130, 1.131, or 1.132 or any other evidence entered by the Examiner and relied upon by

Appellants in the Appeal:

NONE.



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**RELATED PROCEEDINGS APPENDIX**

Copies of decisions rendered by a court or the Board in any proceeding identified about  
in Section II pursuant to 37 C.F.R. § 41.37(c)(1)(ii) submitted herewith:

NONE.